NREL

CAEM

Analysis and Development of Model Options of Electric Utility Rates and Tariffs Affecting DER

Subcontract Number: ***(Contract being finalized)***

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Electric Distribution Transformation Program

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Relevance to Problems & Needs (20%)

- Distribution service rates and tariffs affect DER economics directly through the regulated charges
  - Distribution rate structure relies on customer classification, class and customer monthly non-coincident peak demand, load factor
  - Scheduled/unscheduled maintenance and demand charges
  - Study fees and interconnection fees
  - Exit fees and stranded costs
- The availability and structure of distribution service choices affect DER economics directly
  - Interruptible/curtailable rates for distribution service
  - Time-of-day/real-time rates for distribution service
  - Standby/back up rates for distribution service
  - Utility demand-response incentives for reduced or flexible use of distribution service

Relevance (continued)

- Access to distribution wires service affects DER economics directly
  - Access to wholesale power markets across distribution wires
    - Availability?
    - Jurisdiction?
  - Access to other retail customers for power sales
    - As applicable in retail choice states
- New institutions can provide a direct economic incentive to DER for its value to the system
  - Load participation in ancillary service markets: ERCOT has Load Acting as a Resource (LaaR) and Balancing Up Load (BUL)
  - Load participation in wholesale markets: PJM has Emergency Load Response; Economic Load Response; Real-time Pricing

Relevance (continued)

- Distribution service rates affect DER economics indirectly
  - Regulated rates for power employ a similar rate structure
    - "Plain old electric service" uses average embedded rates and a one-size-fits-all mentality that fosters inefficiency and blunts market forces
    - Power, transmission, and distribution service are generally parts of one rate structure in the mass market
    - Larger customers are offered rates that reduce on-site generation, combined heat and power (CHP) and other 3rd party investments
  - Competitive offerings in the mass market employ a similar rate structure
    - Structure is familiar (innovation in the mass market is risky and difficult)
    - Default rates in restructured markets look like "plain old electric service"
    - Special metering is not widespread in the mass market
    - Virtual choice (*á la carte* menu-of-service options) is rare
  - Competitive offerings in C/I market may be innovative, but distribution rates may be a large portion of the total cost for mid-sized customers, and the rate structure influences the economics of DER

Relevance (continued)

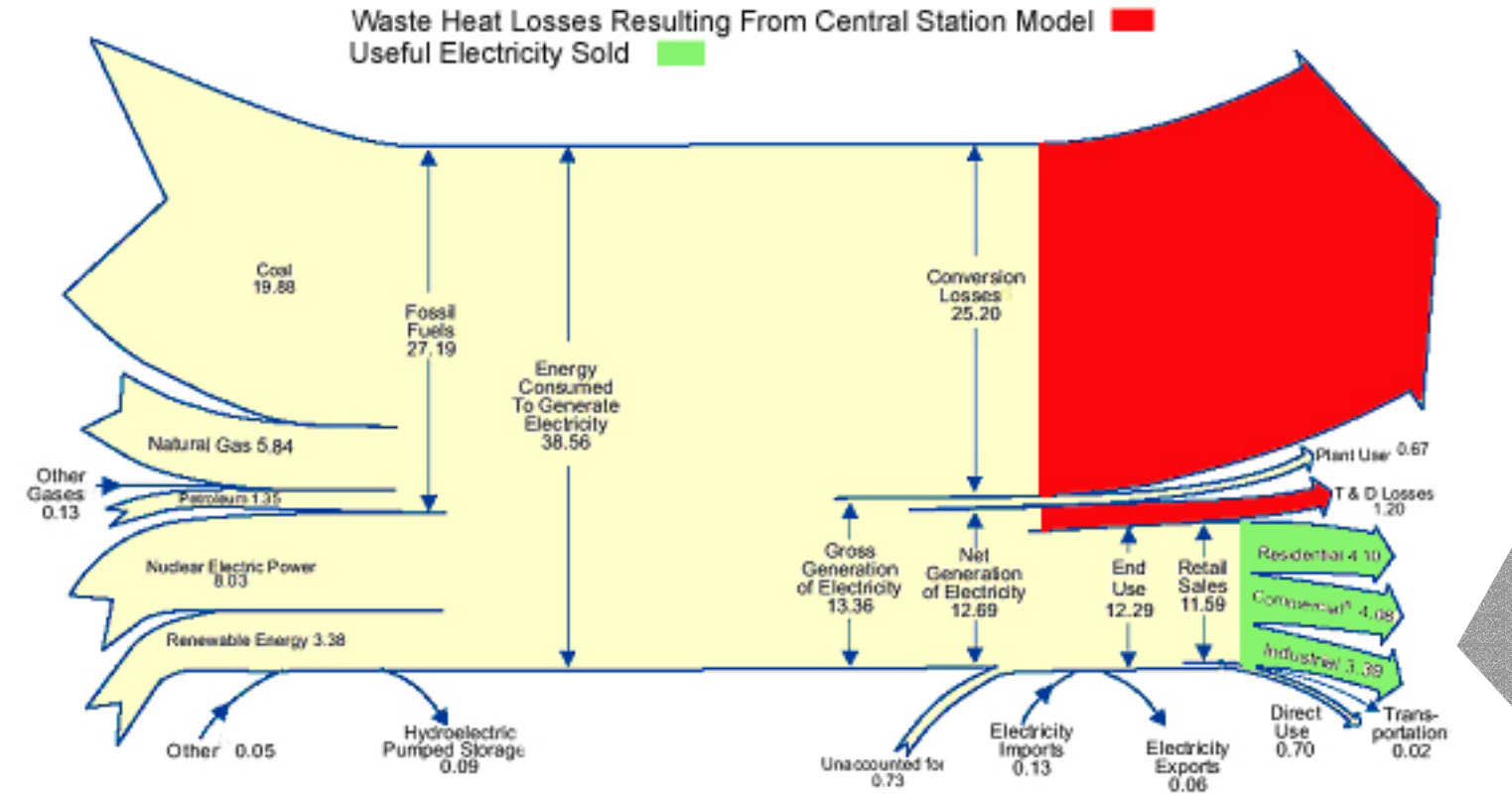
- Legacy cost-of-service ratemaking uses accounting records and focuses on allocation to customer class and cost recovery
  - The process imposes a social policy equivalent to 100% reliance on DSM cost-benefit analysis test ("rate impact measure" or RIM test)
  - This focus on the electric utility's past expenditures excludes a broader perspective and a forward-looking perspective
  - Investments in combined heat and power (CHP) are discouraged
  - Numerous end-use energy efficiency investments are discouraged
  - Portions of the energy services market do not function well

- Conclusion: *Regulatory decisions regarding cost responsibility, rate structure and wires access determine whether a foundation exists for a rational market response to DER.*

Relevance (continued)

Enormous waste occurs within the "Useful Electricity Sold" flow because regulated rates are inefficient!

Diagram 5. Electricity Flow, 2001
(Quadrillion Btu)



Technical Challenges of Current Practices

- Current practices result in economically inefficient rates
  - Emphasis is on cost recovery (collecting the revenue requirement)
  - Efficiency (either economic or technical) is considered much less important
  - DER customers do not have typical load shapes
  - One-size-fits-all ratemaking is simple, but economically inefficient
  - Customer energy service needs vary; customers want choices (real or virtual)
  - Rate design is secondary to cost accounting and cost allocation
  - Each jurisdiction makes determinations based on past practices; regulated rates take on an “aura of authenticity”
  - Legacy definition of fairness, as set forth in state statutes, is reinforced through regulatory interpretations (administrative case law changes very slowly)
  - Forward-looking approaches are considered activist
  - Reduced usage by a customer raises suspicion that the customer is – by definition - not paying his/her fair share
  - Exit fees discourage alternatives to the utility and strengthen monopoly power
  - Past practices never assume that customers can bring value to the system

Technical Challenges (continued)

- Current practices do not improve reliability
  - An inelastic demand curve is assumed
  - A supply-side mentality is adopted
  - Demand responsiveness is the ignored half of the equation
- Current practices do not help infrastructure security and resiliency
  - A large central-station network is vulnerable
  - More and stronger supply will not guarantee security
  - DER technologies can function independent of the network
  - Off-grid applications and small, local networks are more resilient
  - DER technologies increase price elasticity, dampen price spikes and enhance grid flexibility

Project Objectives

- Three objectives
  1. Analyze existing distribution service and DER rates and tariffs
  2. Develop model options for electric utility rates and tariffs affecting DER
  3. Present the results to regulatory commissioners
- Two Models
  - Model options for DER rates and tariffs
    (Considering all issues; applicable to all jurisdictions)
  - Model distribution service rates and tariffs
    (Considering a state-of-the-art approach to distribution service pricing; applicable to retail choice jurisdictions)
- One goal
  - Present model rate and tariff options that rely on best regulatory practices to facilitate a rational market response to DER

Technical Approach (20%)

- Process: issue identification; collaborative analysis; solutions development; presentation
  - Examine existing literature; prepare an issues paper
  - Present issues paper to regulators (NARUC)
  - Conduct a stakeholders meeting to critique the paper
  - Survey state commissions and additional stakeholders
  - Research recent state proceedings; federal jurisdictional issues
  - Conduct small expert meetings to develop issues
  - Develop state-of-the-art distribution rate model
  - Draft a set of recommendations regarding model DER rates and tariffs and model distribution service rates and tariffs
  - Conduct a stakeholder meeting to critique the recommendations
  - Finalize recommendations and present to regulators
  - Prepare a final report

Technical Approach (continued)

- What is the difference between "Model DER Rates and Tariffs" and "Model Distribution Service Rates and Tariffs"?
  - "Standby rates" apply to distributed generation customers
    - But … choosing the amount of service you want can apply to all customers (including CHP, efficient appliances, load control, curtailment of an industrial process, etc.)
  - "Interruptible distribution service" applies to particular customers, as specified in the tariff
    - But … choosing distribution service firmness can apply to all customers
  - "Time-of-day distribution rates" can be designed for to meet the needs of customers with particular characteristics
    - But … choosing time-of-day distribution service can apply to all customers
  - "Exit fees" apply to particular circumstances defined in the tariff
    - But … model distribution service rates can assign to customers only the assets dedicated to that customer; all other assets are assigned to the customer groups that use them

Technical Approach (continued)

- Model DER rates and tariffs *will allow states to choose what they need*
- Menu-of-service options *will allow customers to choose what they need*
- Three dimensions of distribution service
  - Time – Incremental distribution system costs are incurred largely to meet peak requirements
  - Geography – Location matters to reduce congestion and delay upgrades
  - Firmness of Capacity – Choice of power reliability and quality should matter

Technical Approach (continued)

- Menu-of-service options permit *á la carte* choice
  - Pay according to time of use
  - Pay according to location
  - Pay according to firmness
  - Pay according to amount of service
- Two implementation approaches
  - Virtual choice (all jurisdictions)
  - Retail choice (retail choice jurisdictions)

Technical Approach (continued)

- Menu-of-service customer offerings would deliver choices for a full range of customer preferences

Multiyear contracts with guaranteed monthly bills ⟷ Price risk ⟷ Real-time pricing, market exposure

Highly-reliable, premium quality service ⟷ Outage risk ⟷ Curtailability, demand-response payment

Technical Approach (continued)

- Not everyone wants these choices
- Today's "plain old electric service" is "premium service"
- Premium service customers do not worry about time of use, location, lack of firmness or amount
- Premium service demands a price premium
- A fragmented industry structure prevails in the US with traditional and restructured markets
- Emotions run high with rate design

Technical Approach (continued)

- Premise: Today's customers are required to pay for distribution services they do not use or want
- Premise: To be sustainable, DER must stand on its own without special payments or the perception of subsidy
- Observation: Appropriate distribution service pricing would would leave DER to discipline of the market and reduce or eliminate the need for DER incentives
- Goal: Enhanced distribution service pricing efficiency to facilitate a rational market response to DER

Life-Cycle Project Timeline

- Milestones/Deliverables
  - Deliverable 1: Initial Report (Month 4)
  - Milestone: Presentation to Regulators (Month 4)
  - Milestone: Preliminary Stakeholder Meeting (Month 6)
  - Deliverable 2: Interim Report (Month 12)
  - Deliverable 3: “State-of-the-Art” Report (Month 14)
  - Milestone: Final Stakeholder Meeting (Month 16)
  - Deliverable 4: Penultimate Report (Month 18)
  - Milestone: Presentation to Regulators (Month 20)
  - Deliverable 5: Final Report (Month 20)
- Budget
  - *(Being finalized) Approximately $180,000 over two years*

FY03 Progress and Accomplishments (30%)

- *(This project will begin in FY04)*
- Interesting developments in several states
- Scores in CAEM's 2003 Retail Energy Deregulation Index (RED Index) report are one measure of retail choice

US State	RED Index Score	Rank
Texas	69	1
Pennsylvania	67	2
Maine	64	3
New York	60	4
District of Columbia	54	5
Michigan	52	6
Maryland	52	6
New Jersey	50	8

Planned Activities for FY04

- Months 1-4
  - Contact interested persons
  - Contact regulators
  - Survey and research
  - Prepare Deliverable 1, the Initial Report (Month 4)
  - Present issues (Initial Report) to Regulators (Month 4)
- Months 5-12
  - Hold the preliminary Stakeholder Meeting (Month 6)
  - Survey and research
  - Conduct expert conference calls
  - Prepare Deliverable 2, the Interim Report (Month 12)

Summary of Out Year Activities

- FY05 activities
  - Deliverable 3: “State-of-the-Art” Report (Month 14)
  - Milestone: Final Stakeholder Meeting (Month 16)
  - Deliverable 4: Penultimate Report (Month 18)
  - Milestone: Presentation to Regulators (Month 20)
  - Deliverable 5: Final Report (Month 20)

Impacts and Benefits (20%)

- Summary
  - Market becomes more efficient (retail customers receive price signals and usage responds to cost; “Econ 101” supply & demand)
  - Customer are better served (customers become directly involved; choice gives customers greater control over the total cost of energy service)
  - Market power is mitigated (customers are less vulnerable to grid prices and conditions that allow gaming or that result in transmission constraints)
  - Distributed power is less vulnerable (power supply becomes more secure and resilience to deliberate attack or acts of God)
  - Risks can be managed (customers manage their electricity needs to avoid high costs, and they install technologies to ensure that power is available as needed)
  - Environment benefits (least efficient generation runs less and CHP is installed more)

Interactions & Collaborations (10%)

- Mass email to 13,000 professionals on CAEM's master list at the beginning, middle and end of project
- Two presentations to state regulators (NARUC)
- Two large stakeholder meetings (Washington, DC)
- Written comments accepted on draft documents from any interested party
- Regular email updates (3-6 weeks) to any interested party including university researchers, international observers, etc.
- Numerous conference calls among small groups of experts
- Survey of state policies and proceedings through DER contacts
- Regular project updates on CAEM and NREL websites

Contact Information

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